CLAIMS

1. A method for production of a low pressure membrane useful for reverse osmosis and nanofiltration which comprises contacting a first membrane containing a crosslinked polyamide salt-rejecting layer with a solution of an organic sulfonic acid compound for a contact time and at a temperature sufficient to produce said low pressure membrane having a water flux of at least about 15 gfd and a sodium chloride rejection of at least about 20 percent for reverse osmosis at 75 psi and 25°C using 0.05 weight percent aqueous sodium chloride.

2. A method as in Claim 1 wherein said crosslinked polyamide comprises the reaction product of an aromatic diamine or triamine and an aromatic triacyl halide.

3. A method as in Claim 2 wherein said crosslinked polyamide comprises the reaction product of an aromatic diamine or triamine, an aromatic triacyl halide and an aromatic diacyl halide.

4. A method as in Claim 1 wherein said first membrane comprises a thin film composite, flat sheet, hollow fiber or tubular membrane.

5. A method as in Claim 4 further comprising disposing said first membrane into a filtration device prior to contact thereof with said solution of an organic sulfonic acid compound.

6. A method as in Claim 4 further comprising disposing said first membrane into a filtration device following contact thereof with said solution of an organic sulfonic acid compound.

7. A method as in Claim 1 wherein organic sulfonic acid compound comprises a sulfoacetic, sulfobenzoic, sulfoisophthalic, sulfophthalic, sulfosalicylic, sulfosuccinic, hydroxybenzene sulfonic, hydroxybutane sulfonic, dihydroxy benzene sulfonic or dihydroxybenzene disulfonic acid or a mixture thereof.

8. A method as in Claim 1 wherein organic sulfonic acid compound comprises a C_1-C_6 alkyl, alkenyl, haloalkyl, haloalkenyl or aryl sulfonic acid compound.

9. A method as in Claim 8 wherein said organic sulfonic acid compound comprises methanesulfonic acid, trifluoromethanesulfonic acid or a mixture thereof.

10. A method as in Claim 7 wherein said organic sulfonic acid compound further contains a C_1-C_8 carboxylic acid, hydroxy, alkoxy or halo functional group or a combination thereof.

11. A method as in Claim 1 wherein said solution of an organic sulfonic acid compound comprises said organic sulfonic acid compound dispersed or dissolved in water, alcohol, glycol, alkoxy alcohol or a carboxylic acid or a mixture thereof.

12. A method as in Claim 1 wherein said low pressure membrane has a sodium chloride rejection of at least about 80 percent and a flux of at least about 5 gfd when tested on 0.05 percent aqueous sodium chloride at 150 psi and 25°C.

///

13. A low pressure membrane useful for reverse osmosis and nanofiltration produced according to the method of Claim 1 and having water flux of at least about 15 gfd and a sodium chloride rejection of at least about 20 percent for reverse osmosis at 75 psi and 25°C using 0.05 weight percent aqueous sodium chloride.

~~15.~~ 14. A membrane as in Claim 1 having a sodium chloride rejection of at least about 80 percent and a flux of at least about 5 gfd when tested on 0.05 percent aqueous sodium chloride at 150 psi and 25°C.

~~16.~~ 15. A composite membrane useful for reverse osmosis or nanofiltration comprising:

a supportive porous under-structure; and

a top layer consisting of a crosslinked polyamide thin film which is adhered to the upper surface of the porous support structure, said top layer having been contacted with a solution of an organic sulfonic acid compound;

whereby said membrane has a water flux of at least about 15 gfd and a rejection of at least 20 percent when tested an a 0.05 percent aqueous sodium chloride at 75 psi and 25°C.

~~17.~~ 16. A composite membrane as in Claim 16 wherein said crosslinked polyamide comprises the reaction product of an aromatic diamine or triamine and an aromatic triacyl halide.

~~18.~~ 17. A composite membrane as in Claim 17 wherein said crosslinked polyamide comprises the reaction product of an aromatic diamine or triamine, an aromatic triacyl halide and an aromatic diacyl halide.

~~19.~~ 18. A composite membrane as in Claim 16 wherein the porous support is a polyarylethersulfone.

20. A composite membrane as in Claim 16 wherein said first membrane comprises a thin film, flat sheet, hollow fiber or tubular membrane.

21. A composite membrane as in Claim 16 wherein the membrane is a component of a spiral-wound membrane filter or a plate and frame filter.

22. A composite membrane as in Claim 16 wherein said organic sulfonic acid compound comprises a sulfoacetic, sulfobenzoic, sulfoisophthalic, sulfophthalic, sulfosalicylic, sulfosuccinic, hydroxybenzene sulfonic, hydroxybutane sulfonic, dihydroxy benzene sulfonic or dihydroxy benzene disulfonic or a mixture thereof.

23. A composite membrane as in Claim 16 wherein said organic sulfonic acid compound comprises a C_1-C_6 alkyl, alkenyl, haloalkyl, haloalkenyl or aryl sulfonic acid compound.

24. A composite membrane as in Claim 23 wherein said organic sulfonic acid compound comprises methanesulfonic acid, trifluoromethanesulfonic acid or a mixture thereof.

25. A composite membrane as in Claim 22 wherein said organic sulfonic acid compound further contains a C_1-C_8 carboxylic acid, hydroxy, alkoxy or halo functional group or a combination thereof.

26. A composite membrane as in Claim 16 wherein said solution of an organic sulfonic acid compound comprises said organic sulfonic acid compound dispersed or dissolved in water, alcohol, glycol, alkoxy alcohol or a carboxylic acid or a mixture thereof.

26

27. A composite membrane as in Claim 16 wherein said low pressure membrane has a sodium chloride rejection of at least about 80 percent and a flux of at least about 5 gfd when tested on 0.05 percent aqueous sodium chloride at 150 psi and 25°C.

AH